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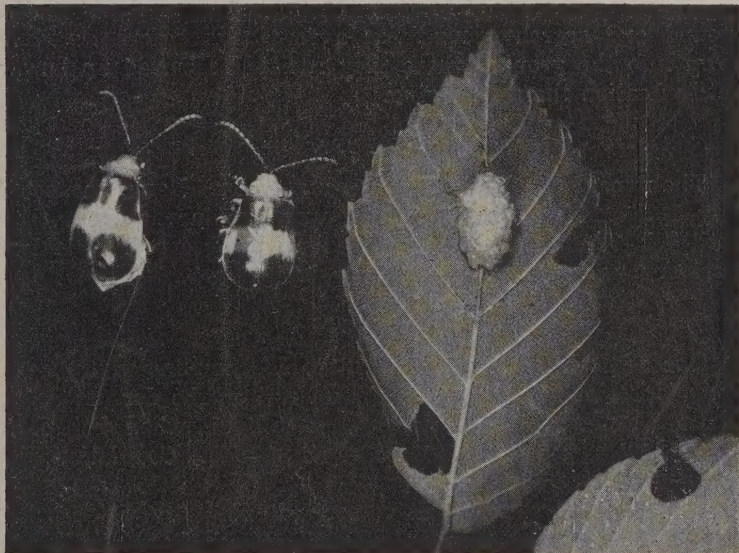
No. 2

NOTES ON THE GREAT ELM LEAF BEETLE¹

E. G. KELSHEIMER, Entomologist
Vegetable Crops Laboratory, Bradenton, Fla.

E.M.W.

The great elm leaf beetle *Monocesta coryli* (Say), during the spring of 1944, completely defoliated two trees of Florida elm,² *Ulmus floridana*, growing on the grounds of the Vegetable Crops Laboratory, Bradenton, Florida. The beetles appeared again in the spring of 1945. No damage occurred to the trees that were so heavily attacked in 1944. Heavy egg deposition



Adults and egg mass of *Monocesta coryli* (Say). The beetle nearest the leaf is a male, the other a female. Photograph by D. G. A. Kelbert.

¹ Det. by C. F. W. Muesebeck.

² Det. by Erdman West.

took place in the spring of 1945, but parasitism reduced the numbers so greatly that little damage resulted. A group of elm trees that escaped injury in 1944 were completely defoliated later in the year of 1945. Most of the damage is done by the larvae although the adults feed for a short time in the spring.

THE EGG

The eggs, 24 to 58 in number, are deposited in a hard yellow crusty mass on the under surface of the elm leaf. The eggs hatch in 14 days.

THE LARVA

The larvae hatch out inside and hollow out the entire mass, leaving just a shell. The newly emerged larvae are greenish yellow in color and average 3 mm. in length. When they chew their way out from the egg mass they remain gregarious for 3 to 4 days before dispersal. The full grown larvae are orange in color, averaging 20 mm. in length. They have a disagreeable habit of releasing an orange liquid when disturbed.

Upon completion of feeding the larvae crawl down to the ground and search around for a few days before crawling down into the ground where they remain as curled up larvae until pupation the next spring.

THE PUPA

The pupae are of a yellow to orange color. Larvae collected July 19, 1944 remained in the ground as larvae from then until Feb. 9, 1945, when the first pupa was observed. The first insectary emergence was March 10, 1945.

THE ADULT

The adult beetles are from 13 to 17 mm. in length, dark brown in color with a broad yellow band on the dorsum. The adults, like the larvae, release an orange liquid when disturbed. Field emergence was first noted April 8, 1945. Copulation and egg laying were observed May 11, 1945.

Further observations will be carried on.

Blatchley in his "Beetles of Indiana" mentions the beetle as occurring in Virginia, Illinois and Kansas. In his "Chrysomelidae of Florida" (The Florida Entomologist, Volume 8, Number 1, page 4, July, 1924) he makes the following records: "In Palmetto, July 3, 1918, the only record we have." [For

Florida.] In "Forest Insects" by Doane, Van Dyke, Chamberlin and Burke, page 239, there is a note, quoted from Riley (1878), on this beetle "doing great damage to slippery elm in Missouri."

OBSERVATIONS ON THE ABATEMENT OF PEST MOSQUITOES WITH DDT RESIDUAL SPRAYS

C. B. WISECUP¹ and W. D. SHILLINGER²

During the investigations on the use of DDT (1-trichloro-2,2-bis(*p*-chlorophenyl)ethane) for the control of mosquitoes, which were conducted in the vicinity of the Stuttgart Army Air Field at Stuttgart, Ark., in the summer of 1944, observations were made on the value of DDT residual sprays as a method of abating the nuisance of pest mosquitoes, such as the *Psorophora* spp. Studies by Gahan *et al.* (1, 2) had shown that these sprays were effective against *Anopheles quadrimaculatus* Say and other mosquitoes when applied to their diurnal resting places.

As a result of the alternate drying and reflooding of the surrounding rice fields, enormous numbers of *Psorophora* mosquitoes invaded the cantonment area of the Stuttgart Army Air Field during the summer of 1944. The annoyance was so great that it became necessary to resort to daily treatment of all halls and corridors in the hospital building by power spraying of regulation Army issue insecticide containing Thanite (a thiocyanate). This situation was undesirable because it disrupted the regular hospital routine and tied up manpower and equipment needed for other mosquito-control work, and because of the rather disagreeable odor produced by the spray.

In July a 10 per cent DDT emulsion was applied to the screens on all entranceways and windows with an ordinary decontamination-type spray cylinder. This spray was made from a basic concentrate consisting of 25 per cent of DDT, 7 per cent of *Triton X-100* (an aralkyl polyether alcohol), and 68 per cent of xylene. (Less than 2 gallons of liquid were used to treat

¹ Entomologist, U. S. D. A., Agr. Res. Adm., Bureau of Entomology and Plant Quarantine, working under a transfer of funds, recommended by the Committee on Medical Research, from the Office of Scientific Research and Development.

² Lieutenant, Sanitary Corps, Eighth Service Command, United States Army.

5 large entranceways, 10 doors, and 200 windows.) One-half gallon of the spray was also applied to the entranceway and interior walls of a large latrine and bathhouse which had become almost untenable because of mosquitoes.

The decrease in mosquito populations within these buildings on the following morning was remarkable. The halls were almost entirely free of mosquitoes, and small numbers of dead or struggling adults were present on most of the window sills. As it is the habit of *Psorophora* mosquitoes to attempt to leave a building, practically all had contacted the treated windows in their efforts to escape. Owing to the absence of mosquitoes the daily spraying was postponed. This postponement became permanent, and no further treatments were necessary in this building despite the continued abundance of mosquitoes in the area. The bathhouse was completely free of mosquitoes for 2 weeks until an overzealous inspector ordered the somewhat noticeable residue washed off.

A heavy application of the 10 per cent DDT emulsion at the quarters of the post commander, including the exterior walls of the house, the lawn, flower beds, and vegetable garden, freed this limited area of pest mosquitoes for at least 10 days, without any apparent injury to the vegetation.

These very definite evidences of control of *Psorophora* adults prompted a series of tests to determine whether applications to daytime resting places of the adults would free large areas of the pests. A 5 per cent solution of DDT in kerosene was applied to half the buildings in the bachelor officers' quarters area, and a 5 per cent emulsion to the eastern half of the station hospital area. In each case a comparable group of buildings was left as an untreated check. Treatments were made with a power paint sprayer mounted on a truck. All entranceways were sprayed, and applications were made to the foundations and walls to a height of 6 feet, as well as to the weeds and grass for a distance of 6 feet from the buildings. Deposits of slightly over 130 mg. of DDT per square foot were laid down.

The daytime presence of mosquitoes was determined by landing-rate counts at several stations within the treated and untreated areas. It was evident that mosquitoes were much less abundant during the daytime in the treated areas. Light-trap records showed that the nighttime activity of these mosquitoes was similar in both the treated and untreated areas.

From the results obtained in these studies it is concluded that annoyance caused by *Psorophora*, and perhaps other mosquitoes having similar habits, can be greatly relieved by applying DDT residual treatments to window screens and screen doors and to limited areas around the buildings.

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A NEW HOST FOR *Composia fidelissima vagrans* Bates E.M.V.

One of Florida's most beautiful moths is *Composia fidelissima vagrans* Bates. The hind wings and body are a most beautiful purple. The fore wings are black with a bright red band along the lower costal border. Both wings are margined with a row of white spots suggesting those of the much smaller and darker polka-dot wasp moth (*Syntomeida epilaris* Walker), whose larvae, following a mild winter, are such a pest of oleanders. The adult male measures 2.25 inches across the outstretched wings. *Composia fidelissima* was described by Herrich-Schaeffer and the variety *vagrans* by Bates in Psyche, December 1933. The typical form is found from Cuba south, but has not been recorded from Florida where it is represented by the variety *vagrans*. This latter has been reported only from south Florida. The larva described by Dyar in the Journal of the New York Entomological Society, Volume IV, page 70, is equally striking, in the last stage being a "beautiful crimson and shining violet." Dyar gave the host plant as *Echites umbellata* Jacq. (*Apocynacea*, the family to which the oleander belongs) but he states that Mrs. Slosson found it on *Canavallia obtusa*, the sword bean. Dyar reports that it fed on oleander in confinement but not "in nature". A specimen sent to the author by Mr. MacDonnell from Miami was feeding on *Stephanotis*. Dyar quotes Brownell as stating that it is abundant in Key West. This species has been taken at Miami, Lake Worth, Key West and Coconut Grove between November and March. Specimens from *Stephanotis* were collected in July of 1944. Erd

—J. R. WATSON

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ENTOMOGENOUS FUNGI

In a recent number of the Botannical Review is an article that should be of special interest to Florida citrus growers. In it, Dr. H. S. Fawcett, of the California Citrus Experiment Station at Riverside, discusses the subject of entomogenous fungi. He emphasizes the close dependence of these fungi on climate and weather; especially the humidity. This often results in a "hasty generalization that, because of failures to get outstanding results with certain fungi in initial trials, the whole field has little promise of practical results."

Dr. Fawcett, before California took him away from us, was head of the Department of Pathology of the Florida Experiment Station.

WHITEFLIES ON GARDENIAS

Among the worst pests of gardenias are the citrus whiteflies. The injury to gardenias is more serious than that to citrus. On the latter, it is mostly the comparatively young leaves that are attacked and the leaf has to be heavily attacked in order to cause it to drop. As the citrus leaf gets older and drier it is not so attractive to whiteflies. It is usually exposed to only one or two broods of the whitefly during a year. On the other hand the gardenia leaf is attractive to whiteflies as long as it clings to the plant. It is often so heavily infested as to have

the under side almost completely covered with the larvae. As a consequence, two or three of the yearly broods attack the gardenia which is often almost completely defoliated. Since the gardenia is liable to be attacked by any one of the three main broods it will often be necessary to spray the plant three times a year. Since the gardenia leaf is decidedly more tender than the citrus, the gardener should confine his sprays to the more highly refined oil emulsions, which usually means the "white" oil emulsion. The adult whiteflies are easily killed by dusting with sulfur but since the sulfur would be active for only a few days, in order that one may effectively control the whitefly by killing off the adults it would be necessary to make several applications for each brood.

—J. R. WATSON

DRAGONFLIES PREDACEOUS ON THE STABLEFLY

Stomoxys calcitrans (L.)

MIKE WRIGHT

(Continued from Vol. XXVIII, p. 13)

The fact that these dragonflies actually fed upon dog flies was verified in the following manner: (1) A number of odonates, especially *Anax junius*, were caught and identifiable remnants of dog flies were found clasped in their mouth parts; (2) dragonflies were observed to catch dog flies which were swarming about livestock; and (3) on several occasions dog flies that had previously been feeding on the observer were seized by dragonflies as they flew away. Large numbers of dog flies were taken while swarming in open areas and while perched on walls of barns, houses, etc. In the open the dragonflies were observed darting about at a height of 1 to 8 or 10 feet in search of prey. These swarms contained hundreds of odonates and they were constantly observed to seize their prey and dart away. Dog flies commonly congregate about houses and especially barns housing livestock, where they spend a good part of the time perched on the walls. Many dragonflies were observed flying up and down the walls and capturing perched dog flies. In the majority of the cases noted the fly was eaten by the predator during flight, but a number of dragonflies were noted to perch before feeding. During the periods of high dog fly population along the beaches relatively few individuals of other species of insects

were encountered. In some localities a number of houseflies were noted, but these were present constantly and were not sufficiently numerous or attractive to hold the swarms of dragonflies after the dog flies were moved inland by a southerly breeze. Thus, the fact that but few other species were present in the dog fly swarms and that the swarms of dragonflies were continually feeding on the flies indicates the large numbers of dog flies destroyed.

It is impossible to convey to one who has not seen these dragonfly swarms a conception of the tremendous numbers of dragonfly individuals present therein. A few examples will be given here in an attempt to picture the populations. On September 10, 1943, large numbers of *Anax junius* were swarming along the beach and the highway, which approximates the beach, just east of Fort Walton, Fla. While the writer was driving along the highway from a point 16 miles east to Fort Walton, he collected about 20 specimens of *A. junius* on the radiator and windshield wiper, while many more hit the front and sides of the car and fell on the highway. Upon reaching Fort Walton it was found that about a dozen dragonflies had entered the opened windshield and were dead or in a dazed state in the back of the car. While standing on the highway or on the beach the air appeared to be literally filled with dragonflies darting about in search of prey. When one realizes that such swarms occur at times from near Pensacola to beyond Panama City, Fla. (over 100 miles), some idea of the uncountable numbers can be made. It might appear that so many dragonflies would soon exterminate the dog flies. They undoubtedly kill countless numbers, but even as numerous as the dragonflies are, the dog flies are many times more so. In addition, the flies, when no control is carried on, produce new broods approximately every 3 weeks, while the dragonflies take at least three months for their nymphal existence.

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THE ECOLOGICAL AND GEOGRAPHIC DISTRIBUTION OF THE THYSANOPTERA OF THE GEENTON

By Geenton, we mean the material on the surface of the earth but not intimately incorporated into the soil. Such material as the leaves on the forest floor, lichens and mosses, dead grass and weeds, Spanish moss and other epiphytes and fungi, rotting wood and other material which has a relation to the soil similar to that of plankton to water. It has not been as much worked by students of thysanoptera as its importance justifies. The reason for this will appear when we take up the subject of geographical distribution of this fauna. In making the collections referred to here, Berlese funnels have been used. These are large funnels at least a foot across; made of tin, kept bright and polished, but with a wire screen inside on which is placed the material to be investigated. As this material dries the insects follow their natural positive geotropic reaction, which leads them to fall into the bottom of the funnel under which is placed a dish containing alcohol. The writer has found that the use of this funnel opens up a new world in the study of thysanoptera; a very rich fauna but a variable one, depending upon the material collected and the ecological situations in which it is collected. These thrips are probably all fungus feeders. Very few occur in the top layer of the leaves on the forest floor, the large *Elaphrothrips flavipes* Hood being most common. Under this top—more or less dry—layer is a layer of leaves which are being actively attacked by a large variety of fungi. It is in this layer that the vast majority of the thysanoptera are found. Underneath this is a layer composed of the residue of leaves which have been thoroughly broken down by the fungi. This is the “duff” layer and contains practically no thysanoptera. These thysanoptera are more abundant in leaves on the floor of our “climax forest” containing many broad-leaved evergreens such as magnolia, bay, holly, live-oak, and laurel-oak, with a liberal mixture of deciduous trees; basket-oak, sweet-gum, hop horn-beam and water beach. Leaves in these situations are the richest in species, from 30 to 40 species being common per square yard. In hammocks where the live-oak is almost the only tree found, there are usually more individuals of thysanoptera but it is not as rich in species. From this climax formation the number and variety of thysanoptera rapidly diminishes toward both the wetter and

the drier situations. Although the magnolia is a prominent member of this association the magnolia leaves themselves are not particularly rich in thysanoptera. The decaying deciduous leaves are more important as a source of food for the thrips which are mostly of the sub-order tubilifera, that is, thysanoptera that do not possess a sharp, saw-like ovipositor for piercing plant tissue but have the abdomen ending in a tube. In the more moist hammocks, such as the flood plains of streams or margins of swamps, where red maples, myrtles, willows, and sour gums are the dominant trees, there is but one genus of thrips that is at all abundant, *Adraenothrips*. It is evident that the material in these situations is too moist to support a rich and varied thysanopterous fauna. In somewhat drier situations where the box elder and the hackberries are the dominant trees, such as at Buzzard's Roost, *Adraenothrips decora* is still the dominant form but other genera begin to appear, especially *Hoplothrips*, the most common of which in this situation is *H. anomocerus* Hood. In drier situations, but still moist, where the water beach, *Carpinus* is the dominant tree, a considerable richer fauna is found although the *Adraenothrips* is still the dominant form. A square yard of this material will yield up to 250 individuals, of which the vast majority are the *Adraenothrips* but in a typical location bordering Lake Alice, eight other species are found.

In a typical low hammock where oaks and sweet gum are the dominant trees, from 100 to 200 thrips will be found per square yard. There are about eight species of which the dominant one is *Hoplothrips pergandei* Hood. In the hammock in the bottom of Goldhead where *Gordonia* is a common species of tree, one collection consisted 80% of *Eurythrips batesi* (Watson). *Hoplothrips pergandei* was also present. In a collection of leaves underneath magnolias and red cedars and both the cabbage and saw palmetto (at Jena) there were no *Adraenothrips*. The dominant species was *Hoplothrips anomocerus* with *Trachythrips watsoni* Hood as the second most abundant. In the dense climax forest where, as previously stated, the most species occur, a square yard of material will usually contain between 30 to 40 species. *Hoplothrips pergandei* is most abundant in Devil's Mill-hopper and in a hammock at Astatula, but other collections at the Mill-hopper showed *Hoplothrips anomocerus* Hood as most abundant. In "Sugarfoot hammock" the most common species in this situation is *Eurythrips batesi*. It is the only species

present in one collection from Gulf Hammock. The closely related *Eurythrips reticulatus* was also common in the Hopper. *Allothrips flavus* was also common. Around the margin of the "Green Sink" on the Horticultural grounds of the Experiment Station, 81% were *Allothrips nubillicauda* Hood.

Going towards the drier associations, the red oak-hickory forest, *Hoplothrips pergandei* is usually the most common form, closely followed by *Eurythrips batesi*. In the dead leaves under laurel oaks six species are common, *Hoplothrips pergandei* being still dominant as it is in the next drier situation, in the turkey oak-pine woods. A square yard from this latter situation will average about 17 thysanoptera of four species. In collections where the needles of long-leaf pine were dominant, *Eurythrips batesi* was the most abundant species. Where mixed with gallberries, as in Goldhead State Park where 150 thrips per square yard was the average, the dominant thrips was *Hoplothrips pergandei*. Collections from under scrub pine yielded 64 per square yard with the common species *Eurythrips reticulata*. Ground fire running through this pine forest destroyed practically the entire thysanopterous fauna.

The woody fungi of the genera *Polypterus*, *Pleurotus*, *Polyporus*, *Polysticus*, *Ozonium*, *Lentinus* and *Aedalia* yielded on the average about six species, the common and perhaps the most consistent genus was *Mesothrips*, which was also very common in rotting sticks. Indian pipe blossoms on the forest floor yielded six species.

SEASONAL VARIATION: Thrips in Geenton material become more abundant during the dry spring season, in early June. With the coming of the heavy rains of summer they decrease in numbers, reaching a low point in late August or early September. This, in connection with the fact that comparatively few thrips are found in a moist situation, practically none in areas ever flooded, shows that this fauna is particularly sensitive to excessive moisture.

GEOGRAPHICAL DISTRIBUTION

The geographical distribution of this fauna is very interesting. It reaches its climax in the southeastern states, rapidly diminishes if one goes west, and especially north. Collections from the Cherokee National Forest in northern Georgia produced 150 per square yard of six species. Collections from Petersburg, Virginia, 100 per square yard, also with six species.

Collections from southern New York produced very few but among them was *Trachythrips watsoni* Hood. Particularly interesting is the situation in the Great Smoky Mountain National Park. From the western slope of the main range—the Tennessee side—numerous collections produced not a single thysanopteron (again showing the sensitiveness of this fauna to excessive moisture), but a parallel, but much lower, range just west of the town of Gatlinburg was moderately rich in this fauna, as were several locations near Laurel Falls in the Park. Going west, a collection of oak leaves from 125 miles northeast of San Antonio, Texas, produced 70 per square yard of seven species, of which *Trychothrips pergandei* was the dominant one, again showing as in the case of the live oak hammock that this species is able to survive in relatively dry situations. A collection of oak leaves taken near Jonesboro, Arkansas, in late August produced but one species, *Hoplothrips angusticeps* Hood. A collection from the banks of the Missouri River at Omaha, Nebraska, also in late August produced but a single individual. A collection of leaves under the Piñon on the brink of the Grand Canyon in Arizona produced one species, an undescribed one. The redwood forest of California produced none, as did also collections of leaves from the Sandia mountains of New Mexico. These two failures, however, may have been due to the drying of the material before it could be placed in the funnels.

The data given here is the result of some hundreds of collections taken over a period of 15 years.

—J. R. WATSON

EFFECTS OF THE REFLECTED SOLAR RADIATION ON INSECTS

ORAZIO QUERCI and LYCAENA ROMEI

(Continued from Vol. XXVIII, p. 21)

The intensity of the rays depends upon that of the rays reaching the ground from the sun, and varies in accordance with the geological nature, color and temperature of the reflecting surface. It depends also upon the difference of temperature between the air and ground. Both humidity and living vegetation absorb the radiations, attenuating their effects. The winds, when they are cold, have the single effect of reducing the temperature of the soil.

The reflected radiations act in accordance with the other factors of the climate. Strong radiations are suitable to the insect life at a low temperature, while they are injurious at a temperature moderately high. It seems that the best living conditions, for most species of insects, occur when the temperature is high and the solar radiation intense but abundantly absorbed either by the wet soil or luxuriant vegetation, or better, by both. Of course there are some species of insects which react to the climate in a manner opposite to the majority.

Now we are trying to explain what we noted at Cuba about the abundance and scarcity of the insects (9).

By the end of October 1929, while travelling eastwards from Havana, we saw everywhere plenty of butterflies. Afterwards, we collected for eleven months near Santiago (10), until November 12 a storm occurred almost every day about at noon. Both before and after these heavy rains the sun was shining so that we were able to go into the country and collect, the soil always remained moist. High temperature, great humidity and feeble reflected radiations (as the solar ones were largely absorbed and scantily reflected by the ground), formed the most favorable conditions for the development of insects, which emerged and flew in large number both day and night.

On November 13, when the rains suddenly ceased, there were certainly in the country a large amount of eggs, larvae, pupae and adults. Little by little the soil dried and began to emanate its radiations, injuring most species of insects which became more and more scarce. The Lepidoptera almost disappeared. We suppose that when the country became barren the eggs continued to hatch, while most larvae and chrysalides were killed. Only a few larvae and pupae, set in some humid places, or where dense vegetation, absorbing the radiations, attenuated their hurtful effects, fell into dormancy and survived. Also some mated females of Lepidoptera aestivated (11). The insects in any stage, which remain long in lethargy, are exposed to parasites and predators which cause the mortality to increase.

Similar massacres are unavoidable, otherwise, as Uvarov states (12): "any insect should be able to multiply its numbers within a short time to limits verging on the absurd, and the earth's surface appears too small for the theoretical progeny of a single pair."

After a period of severe drought, some rainy days alternated with sunny ones and the climate seemed to be favorable, while

most species of insects were all but missing. We now realize that those rains were unaccompanied by high winds and that they fell in the morning so that the water soon evaporated and generally the soil remained damp for no longer than three or four days. Even though the larval cycle, in that subtropical zone, is very rapid, it is doubtful that the larvae could mature in so short a time.

Only on May 18 and July 12, did the storms occur after after sunset and a large amount of water penetrated deeply into the soil during the night and the country remained moist for about a week. Many larvae, pupae and dormant adults broke off their lethargy not only because of the humidity and scarcity of reflected radiations, but perhaps under the influence of the ionized air and dropping of the barometric pressure.

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Rome, Italy, May 12, 1945.

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BAYARD FRANKLIN FLOYD

A former member of our Society, and an authority and leader in the citrus industry of Florida died on November 23. Although his training was primarily in plant physiology, he wrote and was well versed in all phases of citrus culture including citrus insects and wrote extensively on this subject for the state journals. He was a beloved leader in citrus circles.

He was born at Kempton, Indiana, March 18, 1882; received his A.B. from the University of Indiana in 1905; was associate botanist of the University of Missouri from 1905-1907, receiving the degree of A.M. from this university in 1907. He came to the Florida Agricultural Experiment Station in 1907 as plant physiologist, a position he held until 1920 at which time he left the state employment to become horticulturist and vice-president of the Wilson-Toomer Fertilizer Company. During most of this time he has resided in Davenport, Florida. He was a member of the AAAS; of the Amer. Society of Plant Physiology; Amer. Chemical Society and was very active, indeed was the very life of the Florida Horticultural Society and its secretary from 1917 on. He will be sorely missed in the Society and in the citrus circles throughout the state.

While serving the Experiment Station, he wrote a number of bulletins and press bulletins. Among them was "Dieback, or Exanthoma of Citrus Trees," Bulletin 140, 1917; "Fertilizing the Potato Crop" in conjunction with Dr. R. W. Ruprecht, Bulletin 158, 1920; "Some Cases of Injury to Citrus Trees Apparently Induced by Ground Lime-stone," Bulletin 137, 1917 (Before this bulletin appeared it was the general opinion that one could not give a citrus tree too much lime-stone.); "Melanose and Stem End Rot" in conjunction with H. E. Stevens, Bulletin 111, 1912. In the annual reports of the Station from 1908 on until 1919 he recorded results of his work in the Experiment Station.

The press bulletins he wrote are No. 90, "Dieback", 1908; No. 93, "Dieback", 1908; No. 104, "Yellow Spotting of Citrus Leaves", 1908; No. 116, "The Air in the Soil", 1909; No. 128, "How Fertilizer Injures Citrus Trees", 1909; No. 135, Protection of Citrus Trees from Drought", 1909; No. 142, "Melanose", 1910; No. 165, "Melanose", 1911; No. 247, "Air in the Soil", 1916.

He was married on June 29, 1910, in Columbia, Missouri. Mrs. Floyd survives him.

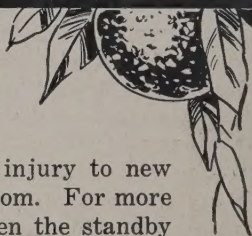
We will include a cut of Mr. Floyd in the next number of the ENTOMOLOGIST as part of this memorial.—J.R.W.

"Black Leaf 40"



KILLS CITRUS APHIS

Protect the fruit and foliage from *Citrus Aphis*. Spray with "Black Leaf 40" while the foliage is young and the infestation is light. Prevent injury to new growth, especially while trees are in bloom. For more than 30 years "Black Leaf 40" has been the standby of particular growers.



ASK YOUR EXPERIMENT STATION

For many years leading authorities have endorsed "Black Leaf 40." It kills insects not only by contact (hitting) but also by fumes. When you mix "Black Leaf 40" with lime-sulphur, oil emulsion, Bordeaux or calcium arsenate, or soap, you convert nicotine sulphate into volatile nicotine with powerful "gassing" properties.

Dusting is often more convenient than spraying on vegetables. The powerful nicotine fumes are released from the dust against the various sucking insects attacking these plants.



"Black Leaf 40" may be added to other standard sprays or dusts. It is highly concentrated, economical—a little goes a long way.

**TOBACCO BY-PRODUCTS &
CHEMICAL CORP.**

Incorporated
LOUISVILLE, KENTUCKY

KILLS BY CONTACT AND FUMES